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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/687,130	10/12/2000	Robert Alan Cochran	10992807-1	1247

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EXAMINER

TO, BAOQUOC N

ART UNIT PAPER NUMBER

2172

DATE MAILED: 10/03/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/687,130

Applicant(s)

COCHRAN ET AL.

Examiner

Baoquoc N To

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: .

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DETAILED ACTION

1. Claim 1-19 are presented for examination.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-6, 8-12 and 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ofek (US. Patent No. 6,101,497) in view of Breitbart et al. (US. Patent No. 5,999,931).

Regarding on claim 1, Ofek teaches method for backing up a computer-readable object stored on a first logical device unit, the method comprising:

when the object is not currently mirrored to a mass storage device, creating a mirror for the object on a second logical device unit on a mass storage device [col. 8, lines 53-56];

when the object and the mirror for the object are split, resyncing the object with the mirror for the object [col. 9, lines 10-18];

splitting the object and the mirror for the object so that the mirror becomes a backup copy of the object and so that I/O requests directed to the object are not automatically directed to the mirror [col. 9, lines 10-18];

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Ofek does not explicitly teach retrieving a current timestamp from the second logical device and saving it as a saved timestamp; updating the timestamp upon executing any I/O operation directed to the second logical device that alters data stored on the second logical device; when the object is determined to need to be restored from the mirror, retrieving a current timestamp from the second logical device; comparing the retrieved current timestamp to the saved timestamp; when the current timestamp is equal to the saved timestamp, copying the mirror to the first logical device to replace or again create the object on the first logical device. However, Breitbart teaches, "a given transaction T_i submits its set of data items in a preprocessing step, the transaction is assigned a timestamp, and the set is broadcast to all physical sites in the system" [col. 3, lines 40-43]. This teaches that the transaction has a current timestamp and by broadcasting to other physical site updates the time of the transaction. In addition, Breitbart teaches, "when T_i submits a write operation on a secondary copy of a data item, the timestamp of T_i is compared to that of the transaction which executed the last write on the data item. If the timestamp is less than that of the last write on the data item, the T_i write operation is not performed. Otherwise, the T_i write operation is sent to the local database management system for execution" [col. 3, lines 47-54]. This teaches that the transaction T_i writes to the second copy only if the timestamp is the same from the last operation. Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention was made to modify the teaching of Breitbart into Ofek in order to provide an update propagation and other concurrency-control

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operations in a distributed database system in which replicated data items are processed at multiple sites, such that global serializability of a transaction schedule can be ensured, while the likelihood of deadlocks is substantially reduced and other problem associated with the conventional approaches are avoided.

Regarding on claims 2 and 8, Ofek teaches including copying the object to a second backup copy on a difficult-to-modify mass storage device after splitting the object and the mirror for the object [col. 1, line 40-43].

Regarding on claims 3 and 9, Ofek teaches when the current timestamp is not equal to the saved timestamp, copying the second backup copy from the difficult-to-modify mass storage device to the first logical device to replace or again create the object on the first logical device [col. 3, lines 48-52].

Regarding on claims 4 and 10, Ofek teaches the mass storage device is one or more hard disk drives and the difficult-to-modify mass storage device is a tape drive [col. 1, lines 40-43].

Regarding on claims 5 and 11, Breitbart teaches the first and second logical units are provided by one or more disk array controllers, wherein data stored to the first and second logical units are stored by the one or more disk array controllers on one or more hard disk drives, and wherein the one or more disk array controllers provide timestamps to requesting applications and systems and update the timestamp associated with a logical device upon executing I/O operations directed to the logical device that alters data stored on the logical device [col. 13, lines 12-37].

Regarding on claims 6 and 12, Breitbart teaches prior to retrieving a current timestamp from the second logical device and saving it as a saved timestamp, enabling time stamping on the second logical device unit, and wherein the timestamp is updated upon executing any I/O operation directed to the second logical device that alters data stored on the second logical device only when timestamping is enabled on the second logical device unit [col. 12, lines 27-53].

Regarding on claim 16, Breitbart teaches the current state metric is a timestamp [col. 12, lines 11-19].

Regarding on claim 17, Breitbart teaches the controller updates the timestamp by saving a current time [col. 12, lines 23-26].

3. Claims 7 and 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ofek (US. Patent No. 6,101,497) in view of Lin et al. (US. Patent No. 5,713,017).

Regarding on claims 7, Ofek teaches method for backing up a computer-readable object stored on a first logical device unit, the method comprising:

when the object is not currently mirrored to a mass storage device, creating a mirror for the object on a second logical device unit on a mass storage device [col. 8, lines 53-56];

when the object and the mirror for the object are split, resyncing the object with the mirror for the object [col. 9, lines 10-18];

splitting the object and the mirror for the object so that the mirror becomes a backup copy of the object and so that I/O requests directed to the object are not automatically directed to the mirror [col. 9, lines 10-18];

Ofek does not explicitly teach retrieving a current count from the second logical device and saving it as a saved count; updating the count upon executing any I/O operation directed to the second logical device that alters data stored on the second logical device; when the object is determined to need to be restored from the mirror, retrieving a current count from the second logical device;

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comparing the retrieved current count to the saved count; when the current count is equal to the saved count, copying the mirror to the first logical device to replace or again create the object on the first logical device. However, Lin teaches, "when the server receives the update request, it will compare the sequence number, M_i , stored in the message and the $I_Counter$. If M_i is larger than the $I_counter$ by 1, then the server will update its local file system and increment the " $I_Counter$ " to indicate that the update request has been serviced. If M_i is equal to or less than the $I_Counter$, the update request is a duplicate and is discard" [col. 7, lines 60-67]. This teaches that one of the replica is the local file with comparing to the server file containing the counter. In the event of update or crash, the M_i compare with the $I_Counter$ to update or to recover the file from the file server. Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention was made to modify the teaching of Lin into Ofek in order to synchronize multiple updates to a replicate file and allow updates to replicate file server even though one of the file servers has failed.

Regarding on claim 18, Ofek does not explicitly teach the current state metric is a counter. However, Lin teaches, "if the system failure occurs, then the value can be retrieved in the event the system is back up" [col. 7, lines 14-16]. This teaches the counter is retrieved for use in the backup when the system is down. The current state metric is a counter. Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention was made to modify the teaching of Lin into Ofek in order to provide a synchronization of

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multiples updates to a replicated file and a recovery from the replicas in the event of system failures

Regarding in claim 19, Lin teaches the controller updates the counter by incrementing the counter [col. 7, lines 14-19].

4. Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ofek (US. Patent No. 6,101,497)

Regarding on claim 13, Ofek teaches a mass storage device that provides logical device units to accessing computers, the mass storage device comprising:

a medium for storing data [col. 7, lines 49-53];

data writing and reading devices for writing data to the medium and reading data from the medium;

memory (memory 19) [col. 7, lines 49-53] and logic processing components [col. 7, lines 54-67]; and

a controller that executes within a logic processing component and controls reading and writing of data to and from the memory and to and from the medium, the controller providing, in a addition to execution 1/O operations, including of read and write operations, to and from logical device units comprising portions of the medium for storing data [col. 8, lines 1-17], mirroring of an object stored on a first logical device unit to a mirror object stored on a second logical device unit [col. 8, lines 25-65]. However, Ofek does not explicitly teach a current state metric for each logical device unit that can be requested by an

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accessing computer. However, Ofek teaches, "if the sum for the status of a track in step 121 is "01", the tracks need to be resynchronized. Step 121 then transfers to step 114 to copy the track from the local system 10 to the remote system 11" [col. 14, lines 34-37]. This teaches the state of the state of the system is access to allow the resynchronization processes. Therefore, it would have been obvious to one ordinary skill in the art at the time of the invention was made to include the status of a track in order to provide a data processing system that that stores a data base on redundant storage devices and that enables the system to run application, concurrently with other applications, such as decision support system application, having the capability of altering data stored in disk storage device.

Regarding on claim 14, Ofek teaches the controller updates the current state metric for a logical device unit whenever the controller executes an I/O operation that changes the data, stored on the medium for storing data, included in the logical device unit's data [col. 10, lines 51-67].

Regarding on claim 15, Ofek teaches I/O operations directed to a logical device unit that enables maintenance of a current state metric for the logical device unit and disables maintenance of a current state metric for the logical device unit, and wherein the controller updates the current state metric only when maintenance of a current state metric for the logical device unit is enabled [col. 12, lines 54-65].

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Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Baoquoc N. To whose telephone number is (703) 305-1949 or via e-mail BaoquocN.To@uspto.gov. The examiner can normally be reached on Monday-Friday: 8:00 AM – 4:30 PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kim Y. Vu can be reached at (703) 305-4393.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231.

The fax numbers for the organization where this application or proceeding is assigned are as follow:


- (703) 746-7238 [After Final Communication]
- (703) 746-7239 [Official Communication]
- (703) 746-7240 [Non-Official Communication]

Hand-delivered responses should be brought to:

Crystal Park II
2121 Crystal Drive
Arlington, VA 22202
Fourth Floor (Receptionist).

Baoquoc N. To

September 23, 2002


SHAHID AL ALAM
PATENT EXAMINER